PENGARUH PEMURNIAN DAN PENDEPOSITAN KALSIUM FOSFAT TERHADAP KEKUATAN MEKANIK SELULOSA BAKTERIAL

Oleh:

Yenny Dwi Budiarti
J2C003165

RINGKASAN

Implantasi biomaterial dapat digunakan untuk memecahkan permasalahan hilangnya jaringan tulang. Salah satu material implan tulang yang dapat dikembangkan adalah komposit selulosa bakterial dengan kalsium fosfat. Penelitian ini bertujuan untuk mengetahui pengaruh pemurnian dan pendepositan kalsium fosfat terhadap kekuatan mekanik selulosa bakterial.

Pembuatan selulosa bakterial dilakukan dengan fermentasi bakteri *Acetobacter xylinum* dalam medium Hestrin-Schramm. Pemurnian selulosa bakterial dilakukan dengan metode perendaman dalam NaOH 4% selama 15 jam dan 3 kali perendaman. Selulosa bakterial yang telah dimurnikan kemudian dideposit dengan kalsium fosfat dengan cara merendam selulosa bakterial dalam larutan $CaCl_2$ dan KH_2PO_4 dengan pH di atas 9 selama 18 jam. Analisis hasil meliputi pengukuran modulus Young dengan Modulus Young Tester dan kristalinitas dengan *X-Ray Diffraction* (XRD). Jumlah kalsium yang terdeposit dianalisis dengan *Atomic Absorption Spectrophotometry* (AAS) sedangkan jumlah fosfat yang terdeposit dianalisis dengan Spektrometer UV-Vis.

Hasil penelitian menunjukkan kekuatan mekanik selulosa bakterial meningkat setelah dimurnikan. Nilai modulus Young naik dari 0,74 GPa menjadi 1,58 GPa. Besarnya kristalinitas naik dari 56,45% menjadi 94,80%. Pendepositan kalsium fosfat ke dalam selulosa bakterial telah menurunkan kekuatan mekaniknya. Modulus Young turun menjadi 76,8 KPa dan kristalinitasnya menjadi 48,19%.

SUMMARY

Biomaterial implantation can be used to solve the problem of bone tissue loss. Composite of bacterial cellulose and calcium phosphate is one kind of a material that can be developed as a bone tissue implant. The present study focused on the effect of purification and deposite of calcium phosphate deposition in bacterial cellulose to the mechanical strength.

Bacterial cellulose was made by *Acetobacter xylinum* bacterii fermented on Hestrin-Schramm medium. Bacterial cellulose was purified by immersed in sodium hydroxide 4% for 15 hours and three times repeatition. The result then deposited with calcium phosphate by immersing bacterial cellulose in $CaCl_2$ 1 M continued by immersing in KH_2PO_4 0.6 M in pH more than 9. The products were analyzed by modulus Young tester and X-Ray Diffraction (XRD). Investigation for calcium deposite was doing by Atomic Absorption Spectrophotometry (AAS) and phosphate investigation with UV-Vis Spectrometer.

The experiment showed that modulus Young of the bacterial cellulose was increased after purified by 0.74 GPa to 1.58 GPa. Bacterial cellulose crystallinity index was 56.45% and it became 94.80% after purified. Deposited calcium phosphate decreased the bacterial cellulose mechanical strength. Its modulus Young and crystallinity index decreased by 76.8 KPa and 48.19% respectively.

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